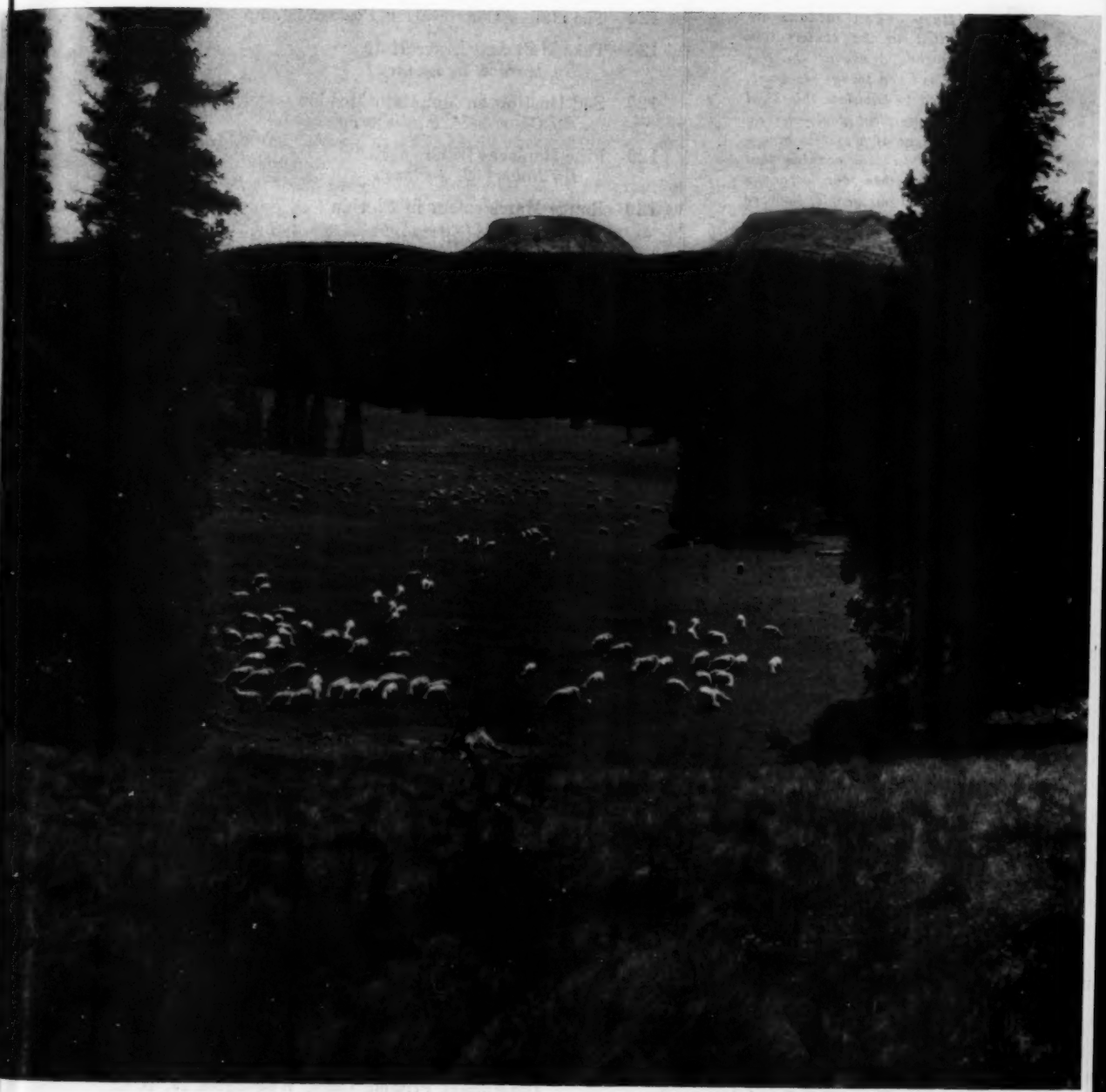
GENERAL INFORMATION

JANUARY 1961

Soil Conservation



SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

VOL. XXVI, No. 6 JANUARY 1961

CONTENTS

"Many organizations are dedicated to the conservation and sustained use of the Nation's soil and forage resources. We need to translate this ideal into a practical goal—the establishment of a system of agriculture in this country that will strengthen our economy, better feed our people, improve our land and increase its production to meet the needs of a growing population—in short, a grassland type of agriculture."
—F. G. RENNER

COVER PICTURE.—Sheep grazing under permit on the Rio Grande National Forest in Colorado.
Photo—U.S. Forest Service

Soil Conservation

EZRA TAFT BENSON
Secretary of Agriculture

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Administrator, Soil Conservation Service

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TOM DALE, Editor

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Range Conservation

By Donald A. Williams

MORE than half of the land in the continental United States is used for the production of native forage. Though a greater part of these rangelands are found in the western States, they are not confined to that region. Rangelands are found from Puerto Rico to Hawaii and from the piney woods and Gulf Coast marshlands of the South to the natural grasslands of the Lake States. The proper use and conservation of these grasslands are matters of great concern to all the Nation.

Only a few decades ago, with most rangelands deteriorating rapidly, many range specialists expressed doubts that much could be done to improve them without wholesale reductions in livestock numbers. The range conservation program of the past 25 years has proved, however, that much can be done to conserve and improve these grasslands while still using them. Millions of acres have been improved and the forage supplies increased even though these ranges are carrying more livestock than ever before.

The recent phenomenal improvement in range production on some areas is due mainly to application of the modern science and art of range conservation. The range conservationist no longer measures a given range on the basis of how many cattle or sheep it can carry with past or present management practices. Rather, he gages it on the basis of its potential forage production with the best treatment and management that range conservation science can provide.

A sound conservation program on rangelands starts with a knowledge of the soils, just as it does on lands used for other purposes. This important fact was overlooked for many years. Not until we learned how to recognize and map soil differences that were reflected in the native vegetation itself did we have a sound basis for conservation. This information gives landowners the key to the potential productivity of their range areas; and an appraisal of the condition of the range, area by area, furnishes the clues to the action needed for its improvement. Such an inventory of his soil and vegetation resources not only tells the rancher where his best forage-producing areas are located, but also indicates those parts of his range that need special attention.

After he has an inventory of his soil and plant resources the rancher has a considerable number of alternatives from which to select those that fit his particular needs. If forage production on some of his range areas has been so reduced that it will not recover in a reasonable period with good management, he may need to do some seeding. Other areas may have grown up to brush that will have to be controlled before the grasses can recover. Additional water supplies may be needed to eliminate concentrations of livestock and damage to the forage, and, in some cases, water-spreading or a better irrigation system for the hay lands may be the quickest means of increasing the forage supply. The cost of such practices, as well as the time required before their benefits are fully realized, will also have to be considered before the rancher makes his final decision to include them in his conservation plan.

Rarely will one rancher's conservation plan be identical with that of his neighbor, because of the great variation between ranches in the size and number of pastures, past grazing use, and differences in soils and vegetation. All successful conservation plans on rangelands have some features in common, however. They provide for an intensity of use that permits "the grass to keep ahead of the livestock" and produce a full crop in succeeding years, and enough flexibility to meet the inevitable fluctuations in forage production that characterize most of the range country.

The rewards for improving the Nation's grasslands—nearly a billion acres of them—are enormous. Despite the considerable progress that has ben made, the experience of landowners from one end of the country to the other has shown that forage production on most of our rangelands still can be increased from 2 to 6 times, an improvement that will provide better protection to our soils and insure the increased meat supplies we will need in the future.

The Range Conservation Postage Stamp

THE world's first range conservation commemorative postage stamp will be issued February 2, 1961, at the annual meeting of the American Society of Range Management in Salt Lake City, Utah. It will go on sale at other U.S. Post Offices the next day, February 3.

The stamp is the eighth in the Conservation Series that has included four wildlife stamps, and in the last three years, stamps featuring forestry, soil conservation, and water conservation.

The new 4-cent stamp will be in three colors—blue, reddish brown, and black. It is a split-frame stamp, one part being a reproduction of "The Trail Boss," a famous sketch by Charles M. Russell, noted western artist, the other half showing a modern range conservation scene. The stamp symbolizes the development of range conservation from the pioneer days of the open range to today's scientific management techniques.

The Soil Conservation Service, Forest Service, Bureau of Land Management, and Bureau of Indian Affairs are cooperating with the Post Office Department and the American Society of Range Management in promoting the stamp.

Although the stamp will be of most interest in the range country, stamp collectors and conservationists everywhere should be interested in it.

Those who wish to have a "first-day cover," a souvenir envelope, can mail addressed envelopes plus a money order or certified check for the number of stamps desired to the postmaster at Salt Lake City, Utah, who will place the range conservation stamp on the envelopes, cancel with a special cancellation mark used only on that day and at that place, and mail as addressed.

Take Half and Leave Half

By Horace L. Leithead

TWENTY-FIVE years ago the theme song of most livestockmen was, "If and When It Rains." Today many a stockman's slogan is, "Take Half and Leave Half," and for a good reason! Their experiences prove that there is more profit in harvesting half of the crop and leaving the other half for soil protection and future grass growth.

Let us examine some of the reasons why ranchmen everywhere are saying, "Since I started leaving half of my grass crop on the ground, my range has been getting better and my profits are going up."

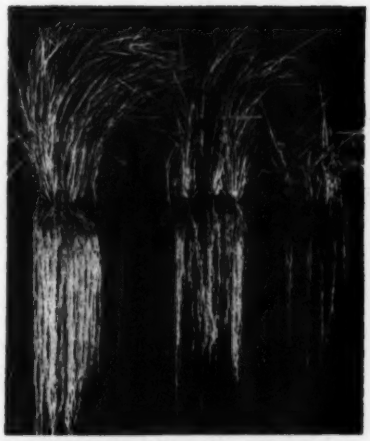
Soil is a reservoir for storing moisture and plant nutrients. But before plants can use all the available water and nutrients, they must develop root systems big enough to occupy the entire soil profile.

Roots develop in about the same proportion as leaf and stem growth —the roots feed the tops and the tops feed the roots.

Undisturbed, this process of plant growth continues in both annual and perennial grasses until the plants mature. Even though the roots of perennial grasses are known to remain active for two and sometimes three years, most of the top growth in any one season is produced from roots that grow that same year.

The intensity with which plants are grazed during the growing season can control plant root development and forage production. This fact is now recognized by many ranchers.

Research by Franklin J. Crider to learn the growth habits of grass roots under different intensities of grazing gives strong supporting evidence of this. When he removed 90 percent of the foliage from a plant during its rapid growth period, all of the roots stopped growing for 17 days. When he took 70 percent of the tops during this same period, approximately 70 percent of the roots stopped growing for five days. Yet when he removed 50 percent or less of the top growth, it had little effect on root growth.



The intensity of grazing affects root growth of 3 little bluestem plants. The plant at the left had slightly less than 50 percent of the top growth removed by grazing during the growing season; about 65–70 percent of the top growth was removed from the plant in the center; the plant on the right was grazed extremely heavy during the same period.

In addition to the effects of close grazing on root growth, August Jantii and Paul J. Kramer, in their research on plant-soil-moisture relationships, pointed out another factor that affects forage yields. They found that ungrazed plants have a physical force for pulling or pumping moisture from soil that is equivalent to 200 pounds atmospheric pressure per square inch. This force is reduced 87 percent when the tops are grazed off.

Their research may explain why there is poor regrowth on ranges that are grazed heavily during a period when soil moisture is low.

Note:—The author is range conservationist, Soil Conservation Service, Denver, Colo.

A range near Ozona, Tex., that has been properly used for several years.

Soil moisture during dry periods may be adequate to keep ungrazed or properly grazed plants growing normally. But this moisture would not be available to heavily grazed plants, which are forced to become dormant because they have lost their physical force to absorb enough moisture from the soil for growth.

Farrel A. Branson gives two other reasons why close grazing and grazing at the wrong season can affect root development and forage production. He explains that when the growing points are two or more inches above the ground, they are likely to be grazed off with heavy use. If the growth points are removed any time during the growing season, no new leaves are produced by those stems that year.

And he points out that leaf growth stops when a plant develops fertile seed stalks. Plant food reserves usually are at their lowest in the roots when the plant starts to head out. Removal of more than 50 percent of the foliage at this stage may not only stop plant growth for the season, but also hinder the plant's chances of replenishing its food supply before the growth season ends. The plant will be weak instead of strong and vigorous the coming year.

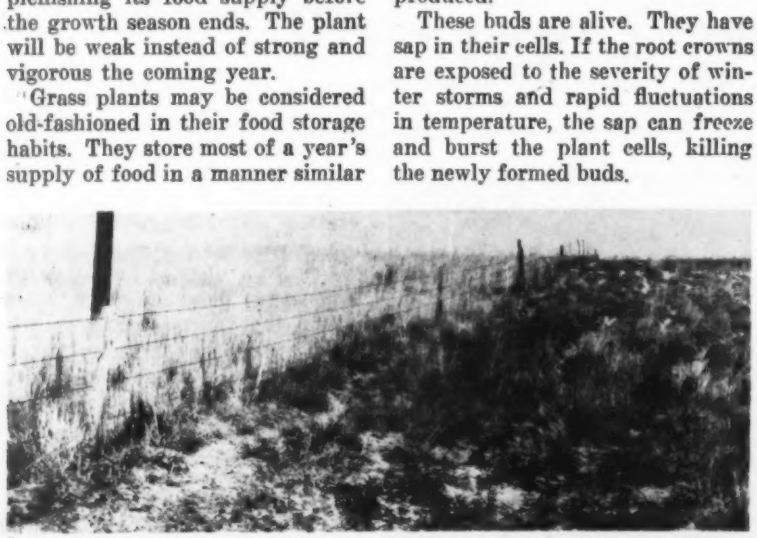
Grass plants may be considered old-fashioned in their food storage habits. They store most of a year's supply of food in a manner similar to that of the pioneers, who canned a year's supply of food in the fall and stored it in a cellar.

Perennial grasses store food in their roots in late summer or early fall. This process starts at the time of seed formation and continues until dormancy. Plants use some of this food reserve during the winter or dormant period. But 70 to 75 percent of the stored food is used to start new growth in the spring and to help keep the plants growing vigorously until the growth cycle is completed and another seed crop is produced.

Harvesting more than 50 percent of the foliage, particularly during the most active growth period, can disrupt this process and weaken the plant. Repeated harvesting year after year during this period can actually starve plants to death.

"Take half and leave half" applies to grazing of ranges during the dormant season just as it does during the growing season. The foliage may be dormant, but the plants have planned ahead for the coming year. Growth buds are formed in the fall on the root crown from which new top growth is produced.

These buds are alive. They have sap in their cells. If the root crowns are exposed to the severity of winter storms and rapid fluctuations in temperature, the sap can freeze and burst the plant cells, killing the newly formed buds.



On Tom Britt's ranch, near Wheeler, Tex., the pasture at left was deferred from the beginning of the growing season until seed had ripened in the fall; the pasture at right was grazed during the growing season, but was properly used.

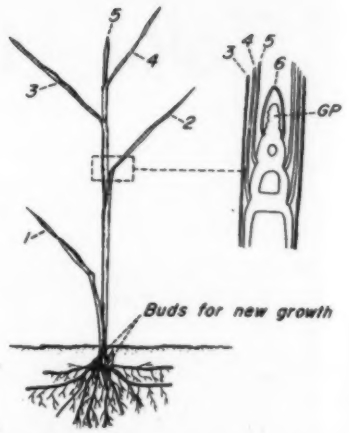


Diagram of a young western wheatgrass stem, and an enlarged cross-section, showing the general appearance of the growing point (GP) and the leaves. The leaves and corresponding portions of leaves on the enlarged insert are numbered for identification.

A good stubble on the ground during the dormant period reduces this type of plant damage. Soils are several degrees warmer at the surface if they have a mulch cover than if they are bare. The stubble also protects the soil from wind. It holds snow and helps in other ways to conserve moisture.

Frank Rauzi, who has been doing research on water intake by the soil on range sites, finds that the rate of water intake, regardless of soil type, depends on the type of plant cover, the amount of standing vegetation, and the amount of vegetative mulch on the ground.

On a silty site near Newell, S. Dak., the intake rate was .61 inch per hour at a location that had 1,200 pounds of vegetative material per acre, as compared to an intake rate of 1.43 inches per hour at a location with 2,600 pounds of vegetation on the surface.

When ranges are properly used, they improve in condition. As ranges approach good to excellent condition, the entire plant-soil-moisture relationship comes into balance. Erosion is brought to a

minimum. Gullies that once were active grass over. This is because water intake by the soil increases and runoff is reduced.

As ranchmen acquire the knowledge of how grass grows, and how different intensities of grazing can affect the growth processes, they are developing grass management programs that make it possible for them "to have their grass and eat it, too." Such programs are being developed for all types of ranges in soil conservation districts throughout the range country.

Proper use of the grass crop is the basic objective of these grass management programs. To achieve this goal, livestock numbers must be kept in balance with the annual forage supply.

A rotation-deferred system of grazing will regulate the season and, to a large degree, the intensity of use on some of the major forage species. Livestock prefer some types of food over others. This preference results in some species being grazed more readily at certain seasons and at different stages of plant development. Some plants are grazed off at the ground. On others, only the seedheads are eaten. On still others, it's the basal leaves that are taken. Thus, some plants are overused every time livestock graze a range.

Even though overuse of a plant for one season may not kill it, overuse will weaken the plant and curtail its production. A systematic deferment of all pastures every two to four years discourages livestock from overusing the same plants year after year.

This system of grazing also gives all plants the opportunity to complete their growth cycle periodically and produce a seed crop. This is important in a grass management program if the more palatable species are to remain vigorous and continue to hold their own in the plant community.

Fencing often is needed before a rotation-deferred system of grazing can be carried out effectively. Fencing ranges according to range sites is the easiest way to control the season of harvest as well as the degree of harvest for the different species of grass.

Livestock watering facilities such as ponds, wells, and pipelines, if properly located and built, also help in distributing livestock over the entire range unit.

Brush control is another range practice that is planned and applied when the rancher is sure it will improve the grass. This practice should not be done until the operator is in a position to defer these areas for at least one year following treatment and to properly use the grass on these areas when grazing is resumed.

This "take half and leave half" idea is so important to the overall conservation program on rangeland that the Great Plains Conservation Program requires all cooperators to schedule "proper use" as a contract item even though the Government does not cost-share on it.

Aside from the conservation aspects of proper use, it makes money for ranchers every time they apply it. Vernon W. Baker, of SCS, made an economic evaluation of the proper use practice for several ranchmen in the sandhill area of Yuma County, Colo., in 1960. This evaluation showed that, on the average, ranchmen who had grazed their ranges properly netted about 44 cents per acre, where overused ranges returned about 19 cents per acre.

Yes, the slogan, "Take half and leave half," is popular with conservation ranchers everywhere. It causes their ranges to absorb more moisture when it rains. It brings erosion to a minimum. It produces more grass. It improves the condition of their ranges, and puts more dollars in their pockets.

Sod Busting on Mountain Meadows

By Charles N. Saulisberry

WHAT to do about improving native mountain meadowlands has been a tough problem for livestock producers of northeastern California. Ranchers in Modoc County, who own the largest acreage of such lands in the State, have launched a program that they hope will get them top forage production.

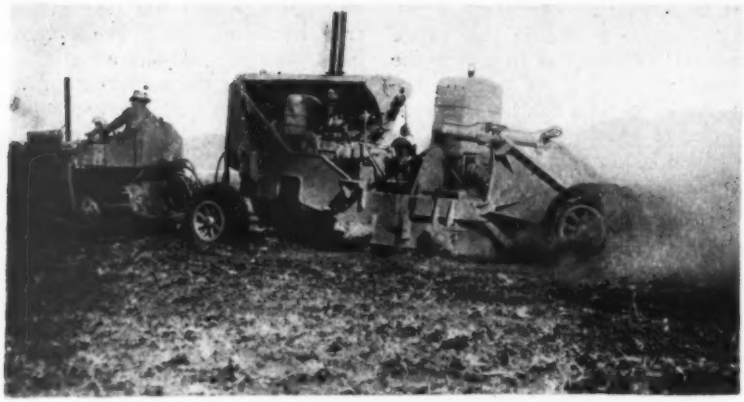
The sodbound and rough condition of the wet native meadows has resulted in poor forage production over the past 20 years. Fertile soils are waterlogged, rootbound, and compacted and capable of supporting only the less productive types of vegetation.

In eastern Modoc County's Surprise Valley Soil Conservation District, ranchers have undertaken a three-year meadow renovation program that includes drainage, breaking up the sod, leveling to grade, and seeding back to improved grasses and legumes.

W. O. Hussa, cooperator and former district director, was one of the first in the area to try this program.

He asked Soil Conservation Service technicians to help determine the feasibility of the project by

Note:—The author is work unit conservationist, Soil Conservation Service, Cedarville, Calif.



"Sod buster" in operation on the W. O. Hussa ranch.

checking soil conditions and making an engineering survey to determine the size of the earthmoving job. On this field, drainage wasn't necessary.

His first step was to run a chisel through the native sod about 14 inches deep. His next move was to get the tough sod plowed and broken up. He contacted rancher John Murphy, at Adel, Oreg., who had designed and built a mechanical "Sod Buster." This machine, powered by a heavy tractor motor with specially designed cutter knives, was run through the meadow to an 8-inch depth and completely shredded and disintegrated the sod. Then SCS technicians staked the field for leveling, and Hussa leveled it to grade.

The following year, the field was planted to grain. Following harvest, the field was re-leveled and seeded to improve grasses and legumes.

Smooth bromegrass, orchardgrass, Alta fescue, red clover, and Alsike clover are best adapted to seeding on these lands. Yields up to 6 tons of high-quality hay have been taken off similar lands. Use of commercial fertilizers and proper irrigation and use will insure long-lived, high-producing stands.

Costs involved in this type of project where livestock is the main production may seem high. However, increasing hay yields from 2 tons per acre to 6 tons in a 4-year period is pretty good evidence that native meadow renovation pays off. Furthermore, the quality of the improved legume-grass hay is superior to the native hay.

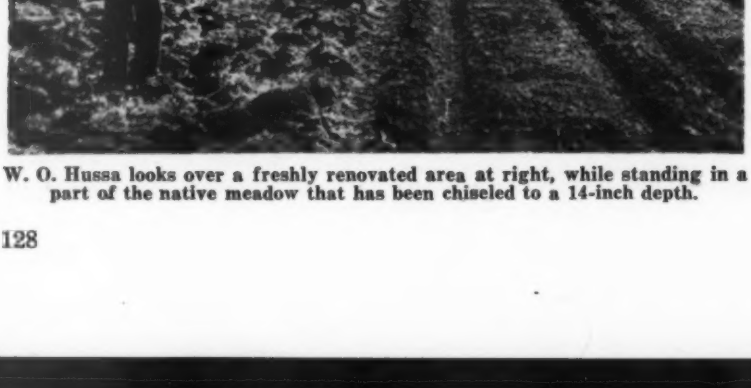
Hussa's cost record showed that his 28-acre project cost about $110 an acre, spread over the three-year period. The total cost includes $20 for sod removal, $65 for land leveling, $10 for seeding, and $15 for chiseling, disking, harrowing, land planing, and installing the border irrigation system.

Improved grass-legume hay crop that yielded 6 tons per acre in 2 cuttings on a recently renovated native meadow.

Recognizing this high cost and also the extreme need for this work in the county, the Modoc County ASC Committee developed a special practice by which ranchers could receive up to $55 per acre through the Agricultural Conservation Program. This payment is spread through the three-year renovation period, and includes the sod-busting, leveling and re-leveling, and seeding back to grass. At the present. this is the only county in the State where ACPS cost-shares for such a practice.

◆

Per capita consumption of meat in the United States in 1959 averaged 160 pounds.



W. O. Hussa looks over a freshly renovated area at right, while standing in a part of the native meadow that has been chiseled to a 14-inch depth.

Pipe Replaces Ditch

By Robert E. Swanson

Water control structure is examined by John Reutzel and son.

SUPERVISORS of the Dry Creek Soil Conservation District point to the installation of a $9,500 irrigation-water delivery system serving 8 farms in Ada County, Idaho, as evidence of good teamwork by farmers.

The new project includes 5 water control structures and 2,950 linear feet of concrete pipe. The system delivers water to 460 acres of diversified crops, including corn, small grains, clover, pasture, and alfalfa hay. It replaces nearly a mile of seepy, rodent-infested ditches. One section of a ditch was so badly gullied it could hardly be used at all.

The old delivery system, leading from the Farmers Union canal, had given many a headache to John Reutzel, Galen Hulse, Art Bolen, R E. Grove, Victor Kent, Walter Lee, Ira Waite, and Harold Hadley. They knew that a lot of water was seeping away in the lateral ditches before reaching their farms. And because of the eroded material which continually washed into field ditches from above, the job of maintenance seemed endless.

In October 1959 these farmers called upon supervisors of the Dry Creek SCD for help in solving their water problems. Philip A. Whiting, SCS engineer, was asked to make a preliminary survey to find out the feasibility of replacing the open ditches with pipe. The survey showed that it could be done. The estimated cost of materials was $6,000.

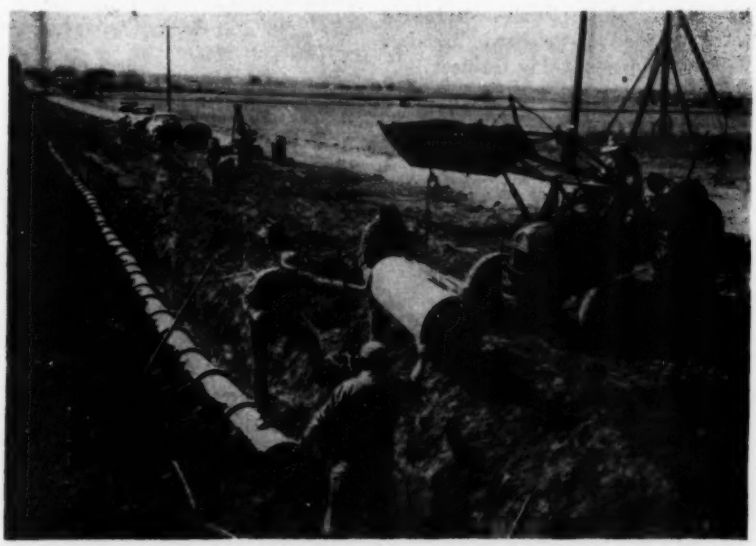
During the winter, the group met several times with SCS technicians and district supervisors to agree upon a construction and operations plan. At one of these meetings, the farmers decided to use their own labor to lay the pipe and build the structures. Next, the group entered into a partnership project called a "pooling agreement" which provided for financial help under the Agricultural Conservation Program. Then Whiting completed the design of the system and construction began in March 1960.

The plan called for 2,718 linear feet of 15-inch concrete pipe and 232 feet of 10-inch pipe. A total of 5 structures were provided for—each with suitable water-measuring devices.

A local contractor excavated the trench for the pipe. The farmers themselves did all the other jobs, which included laying the pipe; backfilling the trench; and building the inlet, diversion, and outlet structures. About 18 cubic yards of concrete was used in the structures.

SCS men supervised construction. The system was ready for use at the start of the 1960 irrigation season. Engineer Whiting believes the results have been so successful that several more group irrigation jobs will be completed in the Dry Creek SCD in the next two years.

John Reutzel, a group member who took over the task of collecting assessments and paying bills during the planning and construction phases, says: "We have at least one-third more water for use on our crops as a direct result of the pipeline. And the labor that formerly was spent on ditch maintenance now is being applied to the improvement of our individual farms."



The farmers concerned use their own labor to lay the 15-inch concrete pipe that replaces the old irrigation ditch.

Note:—The author is work unit conservationist, Soil Conservation Service, Eagle, Idaho.

Range Management in Florida

By L. L. Yarlett

Salt marsh range in excellent condition, in the Gulf Soil Conservation District, with smooth cordgrass and seashore saltgrass being the principal forage plants.

THE history of Florida's cattle industry dates back further than that of any other State. In 1521 Ponce de Leon brought the first cattle to Florida and late in 1530 additional stock were introduced by DeSoto. Although small in number at first, cattle have utilized the native forage of the flatwood, prairie, fresh marsh, and hammock range sites for nearly four and one-half centuries.

Cattle were herded in the vicinity of St. Augustine as early as 1712 by cattlemen who supplied beef for the Spanish garrison. In northwest Florida sizable herds of cattle grazed the meadows along the banks of the Apalachee and Apalachicola Rivers about 1740. Great herds of cattle were owned by the Miccosukee Indians in the northern part of the State during the 1770's. Micanopy, great chief of the Alachua branch of Seminoles, and his father owned large herds in the vicinity of present-day Gainesville.

Trailing of cattle predated the historically famous western Chisholm and Goodnight Trails by as much as 120 years. Long cattle drives originating in north and central Florida terminated near Ft. Myers where they were loaded on schooners and sailing vessels bound for Cuba. Cattle markets did a flourishing business in the coastal towns of Jacksonville, Punta Rassa, Pensacola, and Cedar Keys as early as 1780 and 1800.

Present business risks and problems of the cattle industry are much the same in Florida as elsewhere. Drought damage, common despite a 52-inch average rainfall, is due mainly to the low water-holding capacity of the sandy soils. Seasonal dry spells during winter months often hamper growth of improved pastures, and the need for sufficient high-quality winter forage continues to be a major problem. Sharp and sudden changes in temperature have been experienced. Ranchers in the Okeechobee Soil Conservation District recall the big freeze and cold rains of 1951 when thousands of cattle died.

Livestock production is relatively low, mainly because of the nutritive deficiency of range forage during fall and winter months. Sharp seasonal variations in forage value are characteristic of Florida ranges. Supplemental feeding or tame pastures are recognized as a must in any good range operation.

Approximately 14 million acres in Florida grow native plants that furnish all or part of the forage for about 1.5 million beef cattle. In a 30-county area of southern Florida, 9 million acres will probably remain in native range even after the present 1 million acres of tame pasture is doubled. Native

Note:—The author is range conservationist, Soil Conservation Service, Sebring, Fla.

Range cattle on a typical flatwood range of Florida that has been overused until wiregrass and carpetgrass are the principal forage plants.

range plants now provide 54 percent of the forage consumed.

Ranching operations now depend to a large extent on the production from native ranges, and such ranges will continue to be the foundation of the Florida beef cattle industry for some time to come. This will be true despite the superior production and nutritional value of improved pastures of white clover, pangola, bahia, and coastal Bermudagrass. Ranchers give a simple reason for this. Native range is available and inexpensive although production per acre is generally low. Most operators feel there is an economic limit to how much improved pasture can be developed and maintained on a practical basis.

Research studies at the Ona Range Cattle Station indicate that a range and tame pasture combination is sound and economical. Most soil conservation district programs for range conservation are based on such a combination.

The basic principles of range management apply in Florida, as elsewhere. Plant succession is vividly evident. Fence line contrasts between relic areas and well managed ranches show the familiar picture of range ecology in action. Throughout the 2 million acres of fresh marsh, the climax maidencane and cutgrasses decrease with grazing pressure. Under too close use these plants are generally replaced by pickeralweed, a common perennial weedy invader. Five million acres of flatwood range vigorously support many species of climax grasses. Notable among these are creeping bluestem, Florida threeawn, lopsided Indiangrass, cutthroatgrass, blue maidencane, broomsedge, and switchgrass. With continuous overuse, however, pineland threeawn (wiregrass), carpetgrass, longleaf and fringeleaf paspalum, bottlebrush threeawn, and annual spikerushes invade.

Saw-palmetto is the main woody invader of the prairie and flatwood ranges. This prostrate-growing member of the palm family plays a familiar role. Within the palmetto clumps, protected and out of reach of cattle, are found many of the desirable range grasses, a seed source for range recovery.

Improved pasture of fertilized pangolagrass, with water control measures to provide irrigation during winter and drainage during summer, furnishes abundant summer forage and permits deferment of native range.

Salt marshes generally are the highest producing sites in Florida. Here seashore saltgrass and smooth and marshhay cordgrass furnish a tremendous volume of forage during the otherwise critical winter months. But black rush, a poor forage plant, quickly invades heavily grazed salt marsh and forms dense stands.

The Monreve Ranch near Stuart, in the Martin Soil Conservation District, is an example of good range management in practice. The flatwood ranges are deferred from March through October, while cows and calves graze on approximately 1,000 acres of pangolagrass and white clover pastures. Cattle are run on 4,000 acres of unburned native range from November through February and fed a 3-1 meal-salt supplement, free choice.

In southern Florida fire is widely used by ranchers to reduce old growth or "rough" of wiregrass, in order to obtain early green growth and spring grazing. However, Dick Kelly, manager of the Monreve, believes that ranges should be burned only about once

Supplemental feeding of a 3-1 meal-salt mixture plus minerals and vitamins on the Monreve Ranch.

Typical growth of saw-palmetto, which is the principal woody invader of overused Florida ranges.

in six years if adequate supplement is used. He is also of the opinion that winter grazing of ranges, with supplements, yields far more forage and beef than spring grazing on ranges that are burned early in the spring.

Although the bulk of the Monreve forage comes from the improved pastures, the native range forage contributes an important item toward a 12-month feed and forage schedule. This system of management is producing a 90% calf crop with 525-pound calves at 8 months of age.

Much remains to be done to materially increase good range management on Florida ranges. Control of surface water during the summer rainy season is needed. Specific nutritive value of the major native grasses month by month needs to be determined. Research is rapidly finding ways and means to control saw-palmetto economically, as well as the use of fire in controlled burning.

Many native grasses are readily grazed but the rancher does not recognize them as being essentially different from the widely known "wiregrass," or pineland threeawn. Ranchers and district cooperators generally show a keen interest and are ready to make management decisions for good range conservation upon learning that all grass is not wiregrass.

A flatwood range site in Florida that is in good condition, with toothachegrass, Florida threeawn, and broomsedge bluestem the principal forage species.

Youth Range Camp In Texas

By Rudy J. Pederson

FOR the past six years, 30 to 40 boys from all parts of Texas have studied and worked together for a full week at a Youth Range Camp, sponsored and conducted by the Texas Section of the American Society of Range Management. The camp is in central Texas, in the heart of the range country. A total of 176 boys have attended to date.

Work at the Youth Range Camp is in keeping with the objectives of the American Society of Range Management—"to foster advancement in the science and art of grazing land management . . ." The stated objectives of the camp are to recognize boys interested in range management, to develop leadership, and to give advanced training to boys in practical range and ranch management.

Boys over 13 years old who are active in 4-H or FFA programs are eligible to attend. Individual expenses are paid by some local organization. In 1960, soil conservation districts, service clubs, banks, ranchers, FFA Clubs, farm bureaus, and the Sheep and Goat Raisers Association sponsored 32 boys. The expenses, not including travel, were about $30 for each boy.

Fortunately, it has been possible to use facilities for housing and eating at the A & M College field camp at Junction, Texas. Without these facilities it would be difficult to operate the camp, since good food, sanitary housing, facilities for recreation, and easy access to the range are essential for smooth operations.

Last year 20 members of the Range Society assisted in the training. They were mostly professional people from the Extension Service, Soil Conservation Service, experiment stations, colleges, livestock organizations, ranches, vocational agriculture schools, and other groups. Five members of the Society stay all week at the camp and direct activities. Other members come for a day or two to give specialized instruction or demonstrations.

A few ministers are members of the Society and have spent the week or have been there for morning and evening discussions and devotionals.

The boys are housed in three buildings and are divided into three "ranches." Each ranch elects a "Range Boss" and a "Foreman." They thus can run their own affairs and help direct the camp. Each group wears a leather bolo tie

Note:—The author is range conservationist, Soil Conservation Service, San Angelo, Texas.

with the brand of an old-time ranch on it.

Field trips to nearby ranches and discussions by the ranchers out on the range concerning their operations and grazing management brings the classroom work into use. Usually two ranches are visited during the week. A trip is taken to the Sonora Range Experiment Station to show the boys what is being tested. Subjects covered during the week include: kinds of plants and how they grow, plant and soil development, range condition, wildlife as a product of the range, range management practices, watershed treatment and management, range judging, veterinary work and livestock testing, career opportunities in the field of range management and conservation, and related subjects.

Notes are taken during discussions and field trips. A notebook and a plant collection are submitted by each boy at the end of the week. These are reviewed by the directors of the camp, and ten boys who have prepared outstanding plant collections or notebooks or have shown exceptional attitude and cooperation are given special recognition.

A range management plan is developed by each boy for a problem ranch. Several of these are presented to the group and lively discussions are held about what should be done. These discussions bring out the alternatives in management and treatment. They give the boys a chance to show what they learned during the week and are considered one of the most valuable parts of the program.

Lecture and discussion at the Youth Range Camp.

Two boys participate in radio programs each day and explain the day's activities and what was learned. This helps to train the boys and also tells the radio audience about range conservation and what is being done at the camp.

A certificate embossed with "Trail Boss" and a Range Society emblem are awarded each boy. He also receives a western belt engraved with the words "Range Camp." An attractive brochure with pictures and review of the activities is later sent to each boy.

After the boys have returned to their homes, they arrange with their sponsor for an official report of their week at camp. A set of color slides, showing the activities, is sent to them and each boy explains activities of the camp and what he learned to his local sponsor, usually at a local service club, FFA or 4-H Club, district supervisors meeting, or other appropriate occasion.

The first range camp was conducted in 1955 when Roger Landers, a rancher and soil conservation district supervisor, was chairman of the Texas Section of the Range Society. He has three sons and was well aware of what they would gain by such a program. A Range Society youth committee under the leadership of Fred Walker, Extension range specialist, organized the first range camp. Members of the Range Society have taken an active part and it has been successful because many organizations have worked together.

A rancher explains how he manages his ranch, while boys examine his lush stand of grass.

•

Top-dressing hay and pasture fields to replace the plant nutrients after the first cutting can pay off in more high-quality forage, lower feed costs, and extra profits from beef and dairy herds the rest of the season, according to University of Nebraska Extension agronomists.

MOUNTAIN MEADOW IMPROVEMENT

By Forrest M. Willhite and Hayden K. Rouse

No. 60

This is the sixtieth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

IN the mountainous regions of the 11 Western States there are about 5 million acres classed as mountain meadows. These areas lie mostly along stream valleys and produce hay and pasture which are used by ranchers, often in conjunction with grazing on adjacent rangeland. They occur at elevations of from 5,000 to 11,000 feet and have frost-free seasons ranging from about 100 days down to seasons when the thermometer drops to 32 or below every night.

The topography and soils of most mountain meadows present a challenge. The sloping and undulating topography makes good irrigation difficult. Soils, formed mainly from stream-laid material, may have a sod mat varying in thickness from 1 to 2 inches over cobble, to a sod mat 6 inches or more over deep, fine-textured soil. All of these soil variations may and frequently do occur in areas too small for practical individual treatment.

The ranchers who brought these areas into hay production often adopted the practice of diverting water from a stream and letting it spread from their ditches over the meadows and back to the stream. Irrigation started with the first spring thaw and continued as long as there was water, or until haying time. Later, diversions brought water to higher slopes, making the lower areas even wetter than before.

Under such conditions, sedges and rushes, which produce 1 ton or less of hay per acre, grow in the flooded areas. A large percentage of the meadows falls in this category. Where drainage is better and intermittent irrigation is used, alsike and timothy do well. With good drainage and controlled irrigation alfalfa may be grown.

Note:—The authors are, respectively, soil scientist and agricultural engineer, Agricultural Research Service, Fort Collins, Colo. Willhite also is associate agronomist, Colorado Agricultural Experiment Station.

Blackstock experimental plots near Gunnison where irrigation, fertilization, and time of cutting grass and grass-legume mixtures were studied in detail.

In 1949, at the request of interested ranchers, the Agricultural Research Service, Soil Conservation Service, and Colorado Agricultural Experiment Station started research on mountain meadows. Problems needing study were drainage, frequency and amount of irrigation, methods of irrigation, adapted species for the diverse climatic and soil conditions, time of cutting, quality of forage, fertilization, and finding what these practices meant in beef production and overall ranch operations. Ranchers provided experimental sites and set up corporations to assist in feeding trials.

This research has shown that yield and crude protein of hay and pasture can be increased and the efficiency of ranch operations improved. It has indicated a need for better drainage and irrigation. It has shown the need for fertilization, more timely harvest, and a shift to higher producing grasses and legumes to replace the sedges and rushes.

First, fertilizer trials with nitrogen and phosphorus were conducted on about 30 ranches representing wide variations in climate, soils, water control, and plant species in the Colorado intermountain area. The results showed that without water control sedges and rushes

Field day at the Carpenter Ranch near Hayden to observe and discuss research results in mountain meadow improvement.

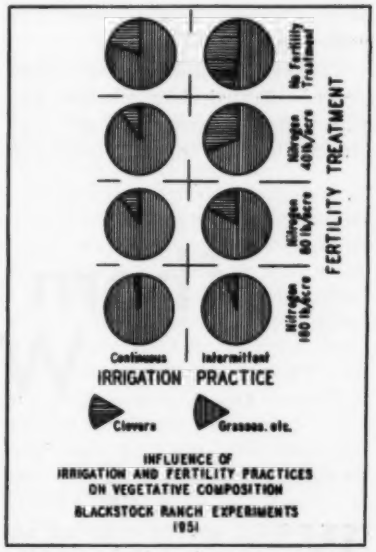
dominated in the wet meadows, yields were low, and fertilizers were of little value. With good irrigation practices and adequately drained land, alfalfa and bromegrass produced excellent yields and nitrogen fertilization did not increase yields. Grass alone, with adequate but not excessive irrigation, responded well to nitrogen fertilizers. Phosphate increased yield on only one ranch of the 30 tested.

Crude protein content of the hay varied from 4 to 12 percent. The presence of legumes, as well as early cutting of grass before bloom, resulted in higher protein content.

Results of these early trials indicated the need for further study. Experiments were set up on the Blackstock ranch at Gunnison, Colo. Three years' tests there showed that with continuous irrigation, 136 inches of water were applied for each ton of hay produced per acre. Most of this water passed through the soil. With intermittent (sprinkler) irrigation only 6 inches of applied water were needed to produce one ton of hay per acre—a saving of 130 inches.

Clovers were crowded out of the initial grass-legume mixture by continuous irrigation. Sedges and rushes came in to replace them and much of the grass. Intermittent irrigation maintained the highest percentage of clover. Nitrogen fertilization increased yields on intermittent irrigation but lowered the proportion of alsike and mammoth red clover. Some typical results are shown in the chart at right.

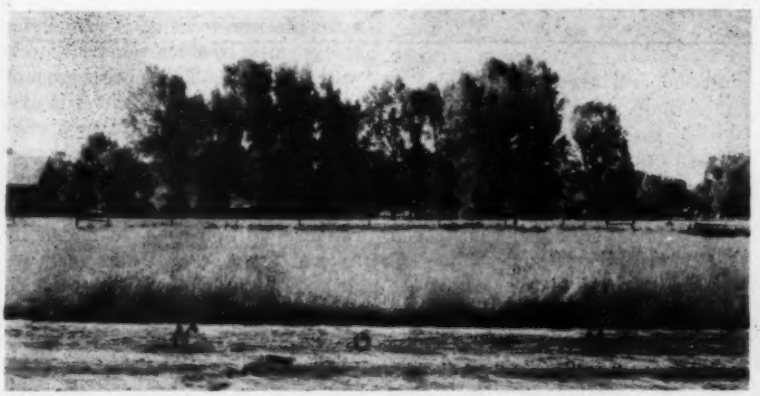
The Blackstock ranch studies also have shown that: (1) Nitrogen fertilization or a high proportion of clovers increases the protein content of the hay; (2) high rates of nitrogen (over 240 pounds per acre) produce higher yields and crude protein contents than could be obtained with grass-clover mixtures; (3) present varieties of clover are satisfactory in only about 4 years in 10—ranchers speak of "clover years" and "non-clover years"; (4) plants take up only 40 percent of the nitrogen applied as fertilizer. Recovery is poorer than this at high rates of application.



INFLUENCE OF IRRIGATION AND FERTILITY PRACTICES ON VEGETATIVE COMPOSITION
BLACKSTOCK RANCH EXPERIMENTS 1951

Additional experiments were established at Hayden, Gunnison, and Fairplay, where the average frost-free seasons are about 90, 70, and 50 days, respectively. Ranchers at these places who practice poor water control and late harvest on unfertilized sedges and rushes average about 1.2, 1.0, and 0.8 tons of hay per acre. The total crude protein is about 150, 120, and 90 pounds per acre, respectively.

When irrigation was controlled and the sedges and rushes replaced with bromegrass but no nitrogen used, production remained about 1 ton per acre. But when nitrogen fertilizer was applied at rates of 200, 400, and 800 pounds per acre, the yields of bromegrass hay were increased on the respective plots to about 2.5, 3.5, and 4.3 tons per acre.



Nitrogen fertilizer, no treatment, and nitrogen plus phosphate plots (left to right) produced 2.9, 2.0, and 3.0 tons of hay respectively with water control, on the Spann ranch near Gunnison.

With good irrigation and drainage and replacement of the rushes and sedges with alfalfa or an alfalfa-brome mixture the hay yields were increased to about 3 tons per acre, without fertilization. The use of nitrogen fertilizer on these plots did not appreciably increase the yields of alfalfa alone, and gave increases of less than 1 ton per acre for the alfalfa-brome mixture, even with 800 pounds of nitrogen per acre.

These results indicate that where grass is planted alone nitrogen fertilization is necessary to get substantial benefits from the improved irrigation and drainage; but, if an adapted legume is planted with the grass or alfalfa is planted alone, good yield increases may be expected without nitrogen fertilizer, and heavy nitrogen fertilization is unprofitable.

Some salient facts produced by research on soil and water management and its effect on conversion of the forage to beef from feeding experiments in a cow-calf operation are given in the table below.

The research results have shown the importance of drainage, irrigation control, legumes where adapted, and nitrogen fertilization of grasses. Better legume varieties are needed. The most difficult job is applying these findings to the difficult terrain and extremely variable soils.

	Usual ranch practices	*Improved practices*
Tons of hay per acre	1.0	4.0
Pounds of crude protein per acre	120	960
Inches of water per ton of hay	136	6
Pounds forage to produce 1 pound beef	20.3	13.3
Pounds water to produce 1 pound beef	208,000	13,000

Thorn Creek Cattlemen Work Together

By J. Boyd Price

"WE'VE got to make an adjustment—let's increase the feed instead of reducing numbers," reasoned Don Fredericksen. This statement was made several years ago at a directors' meeting when Fredericksen was president of the Thorn Creek Cattle Association. The other directors agreed. They all had the same problem—not enough range forage for the number of livestock they wanted to run.

With increased feed as an objective, they plotted a course of action and began a development program with no apparent end. Range improvement projects are planned for several years to come and they have been at it now for almost 10 years.

They began with the purchase of about 2,000 acres of deeded land. They used this to get the Bureau of Land Management to put together a 7,000-acre block which could be improved and managed as a grazing unit.

Fencing, the first requirement, was completed the first year after the land was acquired. Contractors asked $700 a mile for fencing. That sounded too high, so the stockmen built it themselves for less than half as much. Thus began a range improvement investment which has run close to $80,000 with participation by the Bureau of Land Management and cost sharing by the Agricultural Conservation Program Service.

In 1953 the Association asked the Wood River (Idaho Pilot) Soil Conservation District for assistance in developing a coordinated conservation plan on public and private rangelands. Through cooperation with the district and assistance from Bureau of Land Management and Soil Conservation Service technicians, an overall range conservation and development plan was worked out.

Action began immediately with the seeding of about 200 acres of burned-over brushland to crested wheatgrass. Other improvements called for in the plan included 3 miles of cross-fencing, 2 spring developments, 10 stock ponds, 1 stock watering well, 300 more acres of seeding, 2 miles of stock trails and roads, and brush control by spraying on about 5,000 acres.

From the beginning, this unit has shown marked improvement in range condition each year, despite several dry seasons. This was confirmed in 1958 when the association directors, together with SCS and BLM range specialists, made a range condition check to determine the effectiveness of the management plan. The seedings were well established and native range had been

Note:—The author is area range conservationist, Soil Conservation Service, Twin Falls, Idaho.

A water development at Rattlesnake Spring that was installed in 1959 by the Bureau of Land Management. The overflow is piped into the pond in the background.

maintained or improved on every area checked.

Deferred grazing is practiced on the total unit each year. Livestock use is limited to two months beginning August 1. Salt is placed in strategic locations to coax cows onto lightly used areas. A rider is hired for the entire season to drift stock into better feed, keep a close vigil on the water, and prevent livestock concentration and overuse of forage in local areas.

The summer of 1956 was extremely dry and the livestock water problem became critical. Temporary sump ponds were dug along Thorn Creek to prolong the dwindling water supply. These finally went dry and the additional demands on the charco-type ponds soon drained them dry. This left only Rattlesnake Spring which, even with its steady flow, could water no more than 100 head of cattle. The remainder of the stock had to be taken to the home ranches.

Fredericksen and his group were not to be caught again in the same predicament. Before the dust had settled, they were plotting the next improvement called for in the conservation plan—a well.

After careful study they decided to build instead a 900 acre-foot reservoir. This was completed in the fall with assistance from SCS engineers and in consultation with Idaho Fish and Game Department officials. The large size of the development was dictated by several facts: (1) The runoff was erratic so that good water years would have to provide adequate storage for possible poor years; (2) the dam site was ideally suited for a high fill which made it possible to take advantage of a natural spillway; and (3) the pond would make good habitat for fish and game birds since it would back water about a mile upstream from the dam.

When the dam was completed a cooperative agreement was made with the Idaho Department of Fish and Game which provided for public access roads, camping facilities, and stocking with trout. Fortunately, runoff from heavy rains completely filled the pond during the first year. It was stocked with legal-size fish and fishing was excellent the first year. Livestock water is no longer a problem.

The determination, cooperativeness, and willingness to invest in improvements shown by this group demonstrate what can be done when a group of stockmen work together. When a need arises, the only questions are: "How do we get it done and when can we get started?" No job, large or small, is neglected if it will do the range some good. One year they planted 1,000 trees by hand along the four-mile stretch of Thorn Creek.

Directors' meetings are held on

Crested wheatgrass, that was seeded by the Thorn Creek Association, shows up in rows among native needlegrass plants on range that once was mainly sagebrush.

the second Tuesday of each month to discuss such current problems as range riding, salting, bull program, and cooperative relations with other agencies. Most often they are laying plans for more range improvements. Traditionally, the meetings of the Thorn Creek group are held at the home of Don Fredericksen.

Other board members of the Thorn Creek Association are Don Sandy, president; Cliff Stutzman, secretary-treasurer; and Zern Mull and Everett Sant, directors. Harry Patterson has been employed as range rider for several years.

The secret to their steady improvement in range condition is annual deferment, proper harvest of forage over a relatively short period, and good distribution of livestock. Presently they are able to graze around 1,400 head of cattle for two months and improve the condition of the range each year. This is good production since more than half the grazing land is on shallow and stony range sites. Only about 500 acres were seedable.

Latar Orchardgrass

By Edwin O. Nurmi

IT'S news when the cows in a pasture will eat one variety of orchardgrass with relish, and not eat another variety in the same field. This selection of one variety over another by grazing animals is a rare occurrence. Yet, that is what has been happening recently on several farms of the Pacific Northwest. The highly palatable orchardgrass is called Latar.

William Cranston, in the Kootenai Soil Conservation District in northern Idaho, is one of 35 Pacific Northwest farmers who have field plantings of this new variety. His cows preferred to graze the Latar-Ladino clover half of a field, while the forage was always eaten less on the commercial orchardgrass-Ladino clover part.

Cranston says, "My cows showed a 10-percent increase in milk production when turned in on Latar. Latar does not show spots of excess nitrogen as much as commercial orchardgrass."

Scientists at Washington State University, working with the Soil Conservation Service Plant Materials Center, were curious to know if this new grass had some chemical difference that made it taste better to the cows. Sure enough, after the tests were completed, Latar proved to have the lowest lignin content of all orchardgrasses tested. It had a lignin content of 6.2 percent compared to 7.8 percent for a commercial strain.

Latar had a long journey before it found its place on Northwest farms. Seed of this orchardgrass was sent to the United States by the Westover-Enlow expedition in 1934. The sample was given to the expedition by the Institute of Plant Industry, Leningrad, U.S.S.R. Seed samples secured by the expedition were distributed to various locations in the United States for comparative testing.

In 1935, a spoonful of this orchardgrass seed, then labeled PI-111,536, came to the SCS Plant Materials Center at Pullman, Wash. It was planted in a single short row to be compared with several thousand other grasses. That put it in a race for survival. By midsummer,

Common orchardgrass on the left is maturing and turning brown, while Latar orchardgrass on the right is not headed out and is still green.

Note:—The author is superintendent, SCS Plant Materials Center, Pullman, Wash.

a dozen plants had emerged in this 20-foot row. Plant scientists carefully measured the height and the seedling vigor of the new plants. Were they better than the grasses we now use, or about the same, or were they inferior? How was this new grass going to be rated?

Its future was doubtful, for most of the plants were weak and sickly looking, and only a few were strong and healthy. After the second year of full growth, these few plants still looked strong and robust. The scientists noted that the plants were exceptionally leafy and that they matured late. It appeared that this new strain might be an exceptional orchardgrass.

Further testing was scheduled. The grass was kept under observation for winter hardiness, disease resistance, forage production, and seed production. After several years of observation, seed was taken from the most desirable plants, and planted in a plot for further testing. This was repeated several times until in 1947 approximately 500 individual plants were started in the greenhouse and space-planted in the field for comparison with individual plants of commercial orchardgrass. After two years' observation, small and off-type plants were discarded, and the 1950 seed was bulked from the remaining plants. From then on, the selection was called P-2453 (accession number of the Plant Materials Centers in the Western States).

But the testing had only begun. How would it do in the field, and how would it react under irrigation? All these questions and many others had to be answered before the grass would find its place.

Starting in 1951, P-2453 was planted in comparison with other orchardgrasses on Washington State Experiment Stations at Puyallup, Prosser, and Pullman. Idaho and Oregon experiment stations also grew these grasses, and the western grass breeders studied them. Seed was increased at the SCS Center at Pullman so that farmers in soil conservation districts could make field-size plantings and compare the new variety with the orchardgrass they had been using.

Commercial-type orchardgrass four years old.

Latar orchardgrass four years old.

Favorable reports began to come to SCS plant specialists about this new variety. It appeared to be winter-hardy, its production was good, the cows liked to eat it, and it was maturing about the same time as alfalfa for hay. Its forage yield at Pullman was found to be equal to the yield of common orchardgrass and superior to the yield of many varieties that farmers were growing.

The final test came during the winter of 1955-56 when orchardgrass seedings suffered severe winter damage. Many well-known orchardgrass varieties were damaged, but P-2453 showed only slight injury and came through the winter as well or better than commercial strains.

By this time the plant scientists were convinced that this new grass was a superior variety. Latar was the name chosen, as it helped identify it as a late-maturing grass.

Latar was released in 1957 by the Washington and Idaho Agricultural Experiment Stations and the SCS Plant Materials Centers at Pullman, Wash., and Aberdeen, Idaho, and in 1960 by the Oregon Agricultural Experiment Station and the SCS Plant Materials Center at Corvallis, Oregon.

Commercial seed production has been increasing during the past two years in Washington and Idaho. About 75,000 pounds of Latar were available for 1960 plantings. Even more seed should be available in 1961.

Highly fertile fields in irrigated areas and fertile, dryland areas of more than 18 inches of annual precipitation are well adapted to this new variety.

Latar joins the growing family of improved grass varieties with names ending in "ar" that have been developed at the Pullman Plant Materials Center. It took 23 years to rise from an unknown grass in Leningrad to the elite status of a registered variety. Latar's future looks bright. It will provide large yields of high-quality forage for dairymen and stockmen, and will give another boost to the growing seed industry in the Northwestern States.

They Farm the Bottomlands Again

on Johnson Creek Watershed

By Claude D. Crowley

YEARS of persistence in getting a program of soil conservation and flood prevention to check the creek's damaging ways is beginning to yield benefits on the 22,610-acre Johnson Creek watershed in western Tennessee.

Four new flood detention reservoirs, which can trap 2,792 acre-feet of runoff water, then release it slowly, are functioning on the upper reaches and tributaries of the sediment-filled stream. Rains which would have put the water out-of-banks in previous years now scarcely cause a rise. Downstream farmers are hopeful that the crop-drowning, scouring, sand-depositing high water which has driven them to abandon much of the fertile bottomland is a thing of the past. Several are cultivating downstream lands this year which would have been extremely risky to plow only a year ago.

The first three dams, containing 149,544 cubic yards of earth, were built last summer at a cost of $99,022.44. The fourth dam, containing 162,943 cubic yards of earth, was completed early this year, several months ahead of schedule. It cost $69,218.86.

The Johnson Creek watershed project, as it nears completion, is an example of what local leadership and cooperation can do with Federal help under the Watershed Protection and Flood Prevention Act, Public Law 566.

Before passage of the small watershed law, there was little hope for improvement of the nearly intolerable conditions. Raw gullies covered over 1,638 acres of the upland. Besides being worthless for agricultural purposes, these gullies spewed thousands of tons of sediment into the sluggish stream with every heavy rain.

Years of this had the creek so silted in that even small rains caused damaging floods to the bottomlands. Sand drifts, several acres in area and as much as four feet deep, covered much of the best bottomland. In other places, sloughs were scoured out by the rampaging water.

Living near the mouth of the creek, and owning 250 acres of bottomland, Crawford Long was a keen observer of the unruly stream's damaging ways.

"We could count on losing about two or three crops out of five," Long said, "and harvesting about one good crop out of five. A two-inch rain upstream would cause a major flood down here."

Almost immediately after the passage of the small watershed act, the landowners applied for assistance.

"This was the first PL-566 watershed in Tennessee on which the SCS gave planning assistance," stated Clarence Daniels, conservationist for the Madison Soil Conservation District, "and we had little information to guide us. Some of the assistance we gave the watershed which took days to work out, now only takes hours."

After the watershed was organized under Tennessee State law, a Board of Directors was elected by the landowners. Major Fred T. Smith, whose grass and beef cattle conservation farm lies in about the middle of the area, was elected chairman.

Without funds, experience, or an example to go by, the directors went to work. "At that time, it just didn't look possible," Long

Note:—The author is assistant State conservationist, Soil Conservation Service, Nashville, Tenn.

Planting pine seedlings on a critically eroded area in the Johnson Creek watershed.

said. But encouragement and help came from all sides. The local newspaper and radio helped to tell the story. The conservation-minded county court appropriated $2,000 to help the new organization get underway.

Even at this stage, however, many of the upland farmers were not convinced that the program would help them.

The first work done with Federal assistance did much to bind the upland and lowland farmers into a more cooperative organization. With $35,250 of Federal aid, 1,410,000 pine seedlings were set on about 1,400 acres of gullied "critical areas." All of the trees were set by hand, using locally-hired labor. The upland farmers could see some promise in the gullied land for the first time. Something had been done. The problem of the idle, eroded land had been attacked.

Things were easier from then on.

A productive bottomland field covered with sand deposits in the Johnson Creek watershed.

In the spring of 1959, a contract for three flood detention reservoirs was awarded. In October, a fourth reservoir was contracted. The district plans to get the fifth and last structure started this year. About 15 miles of the channel will be cleared as the final construction phase of the project.

When the construction measures are complete, even greater benefits are expected.

"I believe we are home free on the flooding," Long continued. "We didn't have a flood last winter. And all those tree seedlings on the upland gullies are bound to help hold back some of the water."

Besides the trees, the upland owners will enjoy the benefits of more water than they have ever had available before. Fishing, wildlife, and agricultural irrigation all stand to prosper.

Downstream farmers will be aided by the protection of their level bottomlands. It will be possible to follow better land use by moving row crops to the more fertile level land. It will now be practical to remove the sand without danger of having the land ruined after the next storm.

Aerial view of newly-completed floodwater retarding structure on Johnson Creek watershed.

Reclaiming Gravel Mines

By J. B. Earle

THE reclaiming of mined land on the State penitentiary farms in Sumter County, S. C., is an outstanding project.

Several hundred acres of land on the farm were leased to private contractors for gravel mining. In order to mine the area properly, several feet of the surface soil and soil materials have to be removed and piled to one side. Then several more feet of gravel and sand are removed and hauled away. When the operation is completed the area is a very rugged piece of ground piled high with mounds of earth. To look at it you would think it an almost hopeless task to ever smooth it out and reclaim it for agricultural use.

But the young, aggressive director of the farms, Guy V. Whetstone, is not easily discouraged. Then too, his long-range objective for these farms is "maximum beneficial use and conservation of all the land and water." Not to reclaim these mined areas would be in conflict with this objective.

Since he is a supervisor of the Sumter Soil Conservation District and is following a basic soil and water conservation plan on his own farm, this objective has become a part of him—a way of life.

His efforts are bearing fruit on about 100 acres which he has successfully restored to usefulness. He is growing kudzu on some of the mined land, but most of it is planted to coastal bermudagrass. He produced 4 tons of hay per acre on some of the coastal bermuda during the summer of 1960, the second summer after the grass was planted.

Many more of the mined acres are in varying stages of restoration. He plans to use some of the mined areas for water storage for livestock and irrigation. In most cases the average level of a field is lowered 10 feet or more during the mining operations, due to removal of gravel and sand. Therefore, some of the areas are too low to reclaim for crops but are close to water-bearing layers of soil material which will provide the ponds with a regular supply of water.

The mined land returns to the State a minimum of $1,000 per acre from the mining leases. This is good business for the State. But it is also good business to reclaim the land and use it to grow coastal bermudagrass and other crops to help feed the more than 950 cows, heifers, and calves on the farms.

To cover these bare areas exposed to the rainfall helps prevent them from becoming a nuisance and converts them to usefulness at the same time. If not covered with vegetation, some of the bare soil would erode away and help to fill stream channels, farm ponds, and city reservoirs with silt or cover productive bottomland with sterile erosion debris.

Note:—The author is assistant State conservationist, Soil Conservation Service, Columbia, S. C.

Gravel mining operations on the penitentiary farms.

After gravel mining was completed, the land looked like this.

Guy V. Whetstone (left) and J. F. Barron display coastal bermuda hay harvested on land recently mined for gravel.

LAND FOR THE FUTURE. By Marion Clawson, R. Burnell Held, and Charles H. Stoddard. 570 pp. Illus. 1960. The Johns Hopkins Press: Baltimore. $8.50.

THIS is a book covering major components of land use in the United States—past, present, and expected.

The authors have brought together data from many sources which they liberally acknowledge. From this information they have drawn up some forecasts or predictions based upon certain assumptions. It is apparent that a thorough study has been made of available facts; yet the authors point out the dangers in making predictions.

With a fixed land base, a population of more than 300 million is pictured by the year 2,000. To accompany this population a gross national product four times as great as that of 1955 is expected along with doubled per-capita income and a shorter work week. These will all increase the demands for goods and services of land—for food, fiber, living space, recreation, highways, etc.

The authors point out that they favor no one land use over another, and they attempt to indicate expected needs for all uses. From the standpoint of agricultural and forest production they see no imminent shortage of land. They see continuing increases in per-acre output and technology coming up with answers which will provide an abundance of agricultural and forest products.

Acute local problems are acknowledged but no panaceas to resolve them are prescribed. Perhaps more could have been said about proposed solutions—which would likely be controversial no matter how well presented.

Especially good are the chapters on land and space, urban uses of land, recreation, and land for grazing. Mention of these does not detract in any way from the others. There are good charts and tables and the book is well indexed.

The soil conservationist will agree with the statement, "There is no useless land. The ultimate resource is the resourcefulness of man." The reviewer would like to have seen more stress on capabilities of the land and on conservation treatment. Also, we wonder why more was not said about water as an integral part of the land problem. And we might wonder about the seeming optimism about the adequacy of land to supply future needs.

Yet, a vast, complex subject is covered in an interesting and understandable manner.

—JOHN W. BARNARD

FROM THEORY TO PRACTICE IN SOIL MECHANICS: SELECTIONS FROM THE WRITINGS OF KARL TERZAGHI. By L. Bjerrum, A. Casagrande, R. B. Peck, and A. W. Skempton. 425 pp. Illus. 1960. John Wiley & Sons, Inc.: New York. $12.

FOUR experts in soil mechanics have compiled this large volume to present the life, bibliography, working techniques, and outstanding papers of their distinguished colleague, Professor Karl Terzaghi. Perhaps more than any other individual he has promoted both research and application in the field of soil mechanics in Europe and the United States. He was born in Prague on October 23, 1883. Thus his work went forward during a period of great need for soil mechanics if the increasingly large structures built on the earth were to endure.

Papers were selected to represent the period of his professional life. These include essays on the basic concepts of effective stress, surface friction, shearing strength, bearing capacity, and the like; as well as several on the application of these principles to varied practical problems, such as control and avoidance of landslides, problems of construction on frozen ground, tunneling in soft ground, problems of settlement, and the design of earthen dams and cofferdams. From these papers one can follow the progress of his professional development and of many aspects of soil mechanics.

This reviewer regrets that Professor Terzaghi did not lend his leadership to the correlation of soil mechanics with soil science, especially soil classification, so that the results of tests on soil samples could be given geographic expression through modern soil maps. But, of course, he could not be expected to do everything. This problem of correlation is being tackled earnestly and will be solved by soil scientists and engineers working together.

This book should be especially useful to younger men in soil mechanics. It shows how many of the theories they have learned were incubated and perfected. Certainly it opens up great vistas of application.

As we look forward to the great unrealized potentials of efficient water use and effective transport in an expanding economy, the significance of soil mechanics is very large indeed. Not the least among those who must understand and use its principles are those responsible for soil and water conservation.

—CHARLES E. KELLOGG

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American farms use more electricity than is used in the cities of Chicago, Detroit, Houston, Baltimore, and Boston.

High Phosphorus Level Helps Beat Drought

Crops are more likely to come through dry spells in good shape if the available phosphorus in the soil is at a high level, according to Sterling Olsen, soil scientist at Colorado State University.

The drier the soil, the more difficult it is for plants to take up phosphorus. As a result, both lack of water and lack of phosphorus may limit crop growth and yields during dry periods, Olsen contends.

If the phosphorus level is high during moist periods, however, most plants will absorb more phosphorus than they need. When a dry spell comes, the plants then can draw on the phosphorus they have stored. This, combined with moisture pulled from the deeper—but generally phosphorus deficient—layers of soil, gives the plants a much better chance to survive drought periods.

Does Range Seeding Pay?

The Bureau of Land Management planted crested wheatgrass on 54,000 acres of publicly owned sagebrush-grass range throughout western Utah between 1952 and 1954. The average cost and returns from 20 seedings of this acreage, as figured by range specialists from Utah State University, were as follows:

Average total cost was $18.51 per acre, which included costs of brush removal, seedbed preparation, seeding, fencing, loss of grazing during nonuse period, and interest on investment during amortization. This represents an average annual cost of 93 cents per acre when amortized over a 20-year period. It does not include risks of failures, water development, or fence and water maintenance.

The calculated average annual gross return based on changes in carrying capacity and increased meat yields, when grazed by yearling cattle, was $3.60 per acre more than returns from untreated areas.

Livestock Production on Southern Woodlands

Twenty years ago, in most areas, woodland grazing was associated with wildfires, overgrazing, large numbers of livestock running in trespass on other people's property, and extensive damage to the reproduction of important timber species. Nearly all large landowners, foresters, and conservationists joined the crusade to "get all livestock out of the woods."

Today, there is a growing appreciation of the economic importance of grazing as a secondary use of southern woodlands, provided the proper kind of livestock and timber management is used. Sound conservation planning is helping landowners determine which kinds of woodland are potentially capable of producing enough forage to justify grazing use, when woodlands should be grazed, the grazing intensity that should be permitted, and the types of management necessary to make woodland grazing a profitable enterprise.

Much more remains to be done, but improved grazing management on thousands of acres of southern woodlands has shown that woodland grazing may be profitable; and has led to increased forage supplies, greater livestock production, and higher income and greater economic stability on farming and ranching units without greatly impairing timber production.

—Robert E. Williams

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During the first 8 months of 1960, commercial slaughter plants of the U.S. processed 17,807 million pounds of red meat. This was 7 percent more than was produced during the same period of 1959.

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The Livestock and Meat Situation report of October 1960 estimates that the number of cattle and calves on farms and ranches in January 1961 will reach an alltime record of about 105 million head.

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The percentage of U.S. corn acreage planted to hybrids has been increasing steadily since 1933 when only 0.1 percent of the total corn crop was planted to hybrids. This year, 81 million acres of the total corn acreage of 84 million acres are in hybrid varieties.